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Solar Drying of Agricultural Produce

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SUMMARY

Drying is especially suited for developing countries with poorly established low-temperature and thermal processing facilities. It offers a highly effective and practical means of preservation to reduce postharvest losses and offset the shortages in supply. Drying is a simple process of moisture removal from a product in order to reach the desired moisture content and is an energy intensive operation. The prime objective of drying apart from extended storage life can also be quality enhancement, ease of handling, further processing and sanitation and is probably the oldest method of food preservation practiced by humankind (Mujumdar, 2007).

INTRODUCTION

The conventional drying system to preserve fruits, vegetables, grains, fish, meat, wood and other agricultural products is sun drying which is a free and renewable source of energy. But, for large-scale production, there are various known limitations of sun drying as damage to the crops by animals, birds and rodents, degradation in quality due to direct exposure to solar radiation, dew or rain, contamination by dirt, dust or debris. Also this system is labour and time intensive, as crops have to be covered at night and during bad weather, and have to be protected from attack by domestic animals. There is also a chance of insect infestation and growth of microorganism due to non-uniform drying. The advancement of sun drying is solar drying systems in which products are dried in a closed system in which inside temperature is higher. Major advantage includes protection against flies, pests, rain or dust. Several significant attempts have been made in recent years to harness solar energy for drying mainly to preserve agricultural products and get the benefit from the energy provided by the sun. Sun drying of crops is the most widespread method of food preservation in most part of India and world because of solar irradiance being very high for the most of the year. As this technique needs no energy during day time, it is more beneficial to the small scale farmers who can't afford the electricity or other fuel for drying. If it is necessary to dry product in night or in bad weather, an additional bio-fuelled heater can be used for heat supply.

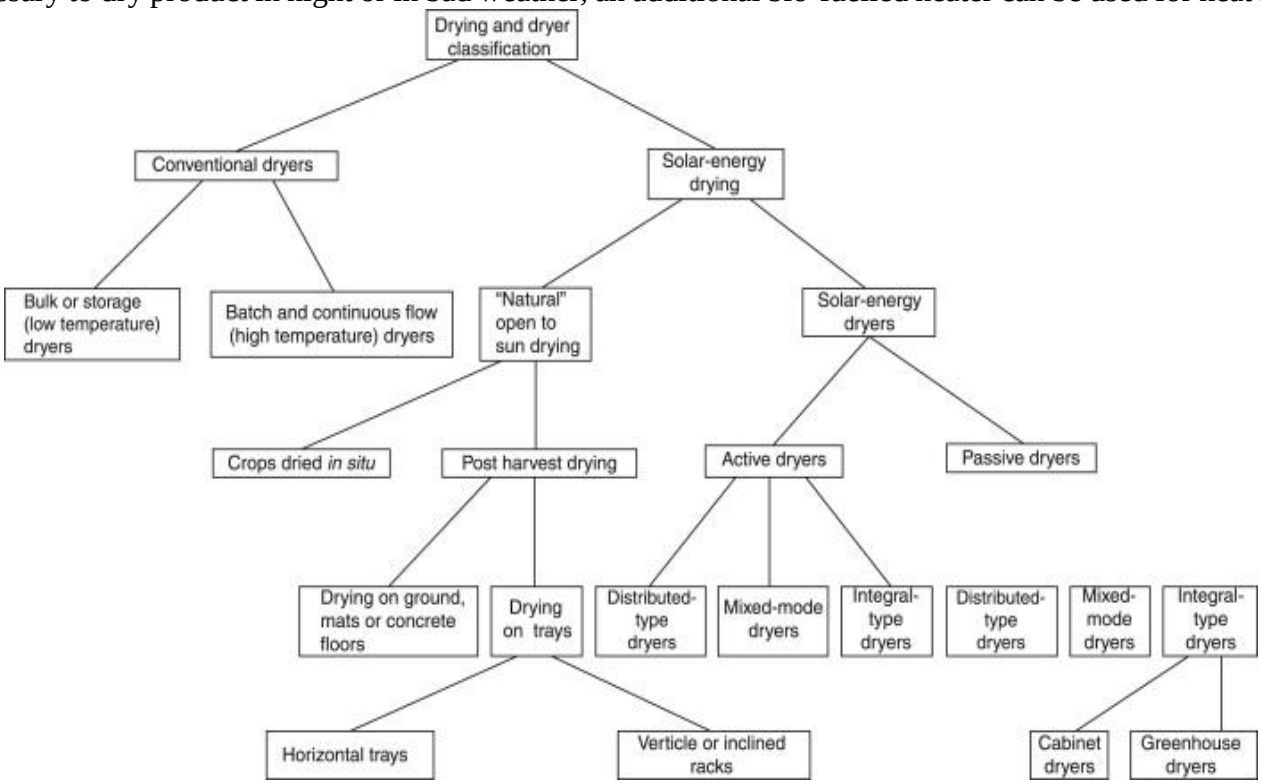

Figure No.1 Solar Dryer Types

The different types of solar energy crop dryers are classified taxonomically as shown in Figure 1.

Scope for solar drying

Increasing population and high cost of fuels have created opportunities for using alternate energies for post-harvest processing of foods. Solar food processing is an emerging technology that provides good quality foods at low or no additional fuel costs. A number of solar dryers, collectors and concentrators are currently being used for various steps in food processing and value addition. Society for Energy, Environment and Development (SEED) developed Solar Cabinet Dryer with forced circulation which has been used for dehydration and development of value added products from locally grown fruits, vegetables, leafy greens and forest produce.

Solar Dryer Types

Solar dryers could be classified as direct or indirect types. The former involves directly exposing the material to the sun. While in the latter, the material is dried by circulating hot air over it without directly exposing the material to the sun. The merits of any solar dryer would depend upon the type and quantity of material to be dried. Sometimes a passive system incorporates a wind-driven fan for the air circulation.
The distinguishing features of different types of solar energy dryers are shown in Figure **2**

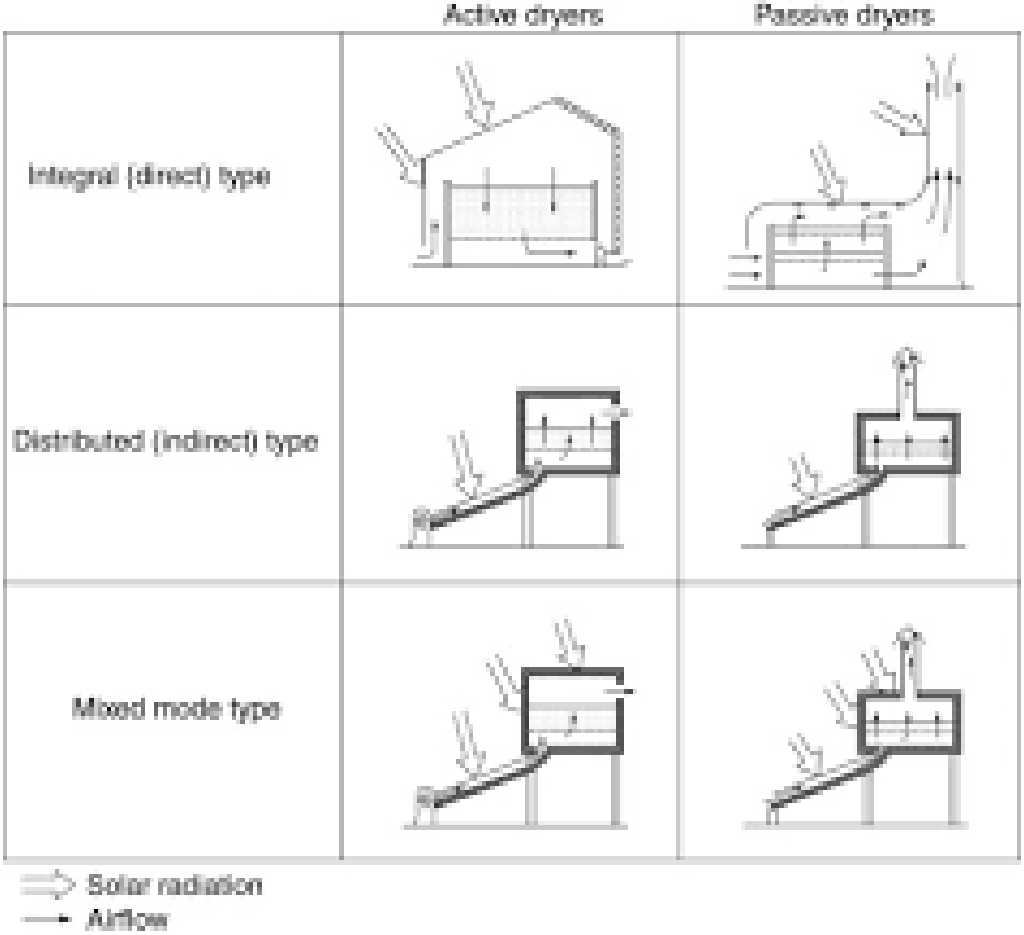

Figure No.2 Different features of solar energy dryers

Advantages of solar dryers

The advantages of solar dryers over traditional open-sun drying include (1) a smaller area of land in order to dry similar amounts of crop, (2) relatively high quality of dry crop, because insects and rodents are unlikely to infest it during drying, (3) shortened drying period, (4) protection from sudden rain, and (5) low capital and running costs.

Quality changes during drying

The action of applying heat to material in order to dry does not merely remove the moisture but can affect the quality of the dried product. These affect are varied from only those phenomena commonly encountered will be describe herein.

Browning: Browning is the discoloration of the material during drying, which can be caused by either the physical processes or chemical reactions. It is depend upon the combustion effect of time and temperature on moisture content of the drying material.

Case Hardening: This is characterized by the material surface becoming drying and relatively impermeable to further flow of moisture but with the interior remaining at somewhat higher moisture content. But with drying of most vegetable and fruit, case hardening is not commonly observed.

Rehydration: It is not be through that rehydration is a complete reversal of the dehydration process. Rehydration in terms of producing rehydrated product similarly in appearance to the original form is not as important as the dried product is utilized in soup or stews by adding directly to the cook pot.

CONCLUSION

Drying is one of the oldest methods of preserving food and has found continued practice till date. It is one of the cheapest alternatives to other expensive food preservation options like Canning, freezing etc. The process of drying of different food commodities varies depending on the nature of product, intended end use, quality parameters and cost economics. Various dryers have been designed and developed keeping in view the appropriate applicable technology, state of food commodity, time consumption and of course ease of operation.

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